CLAIMS

1. A system for determining the intracorporation position of a working catheter (10), comprising

a working catheter (10) which is adapted to carry out desired working operations, and

an intracorporal reference catheter (2) which is adapted to produce a co-ordinate system,

characterised in that the working catheter (10) has a plurality of working catheter reference units (4a-c) which are adapted to send signals which are characteristic for the position of the working catheter (10), and

the reference catheter (3) has a plurality of reference catheter reference units (14) which are adapted to receive the signals sent by the working catheter reference units (4), and

the system further has a processing unit (16) which is adapted to calculate the position and the intracorporal orientation of the working catheter (10) on the basis of signals received from the reference catheter reference units (14a, 14b).

2. A system as set forth in claim 1

wherein the working catheter (10) is a mapping catheter for generating a three-dimensional image of the heart cavity surrounding the mapping catheter.

3. A system as set forth in one of the preceding claims

wherein the working catheter (10) is an ablation catheter for producing a preferably linear lesion of the endocardium surrounding the ablation catheter.

4. A system as set forth in one of the preceding claims

wherein the working catheter (10) is a catheter which can be fixedly implanted in a body and which carries electrodes of a cardiac pacemaker or a defibrillator.

5. A system as set forth in one of the preceding claims

wherein the working catheter reference units (4a-c) are arranged on the working catheter (10) asymmetrically, preferably forming the corners of a triangle, in such a way that the orientation of the working catheter (10) can be detected in the co-ordinate system of the reference catheter (2).

6. A system as set forth in one of the preceding claims

wherein the reference units (4, 14) are coils or ultrasonic crystals mounted on or in the catheter.

7. A system as set forth in one of the preceding claims

wherein at least one reference unit (4a) is arranged at the catheter tip (30) while at least one further reference unit (4b, c) is arranged in the rest of the distal region (12) of the catheter (10), wherein preferably a whole series of reference units, more preferably between twelve and twenty four reference units, is arranged in the distal region (12).

8. A system as set forth in one of the preceding claims

wherein the distal region (12) of the working catheter (10) is of a previously established specific shape, preferably that of a circular arc, on which distal region at least three reference units (4) are distributed so that the specific, previously established shape of the distal region (12) can be incorporated by the processing unit (16) when ascertaining the position of the working catheter (10) when calculating the position of the working catheter (10).

9. A system as set forth in one of the preceding claims

wherein the reference catheter (2) is also a working catheter (10) or the working catheter (10) is also a reference catheter (2) insofar as provided on each catheter are respective reference units (4, 14) for transmitting waves and reference units (4) for receiving waves, preferably electromagnetic and/or ultrasonic waves, and/or provided on each catheter

are respective reference units (4, 14) which can simultaneously transmit and receive the waves, preferably electromagnetic waves.

10. A system as set forth in one of the preceding claims

wherein the processing unit (16) is adapted by means of the reference units (4) to implement topological and/or electrical measurement of the endocardium in which the respective working catheter (10) is disposed.

11. A system as set forth in one of the preceding claims

wherein the reference catheter reference units (14a, b) are adapted to irradiate electromagnetic radiation and/or ultrasonic waves in order to ascertain the position of the working catheter (10) in the co-ordinate system afforded by the reference catheter (2), wherein the reference catheter reference units (14a, b) build up at least one electromagnetic field.

12. A system as set forth in one of the preceding claims

wherein in use of the system in the heart the reference catheter (2) is preferably placed in the coronary sinus.

13. A system as set forth in one of the preceding claims

wherein the processing unit (16) is adapted to calculate from the data from the at least three working catheter reference units (4a-c) a three-dimensional spline which represents the position of the working catheter (10) in the co-ordinate system defined by the reference catheter.

14. A system as set forth in one of the preceding claims

wherein the processing unit (16) is integrated in the respective catheters.

15. A system as set forth in one of the preceding claims

wherein at least one of the reference units is in the form of a sensor for detecting the presence and/or the strength of the wall contact of the working catheter (10) with the endocardium surrounding the catheter.

16. A system as set forth in one of the preceding claims

wherein the system has at least two and preferably five working catheters (10), wherein each catheter has at least three and preferably between twelve and twenty four reference units which more preferably are in the form of electrodes and still more preferably in the form of ring electrodes in order thus to detect the corresponding number of potential differences in the case of working catheters inserted into a cavity in a heart.

17. A system as set forth in one of the preceding claims

wherein the reference units are in the form of electrodes, preferably ring electrodes.

18. A system as set forth in one of the preceding claims

wherein the reference units which are preferably in the form of electrodes, more preferably ring electrodes, are actuatable simultaneously by the processing unit (16).

19. A system as set forth in one of the preceding claims

wherein the working catheter (10) is provided with a number of at least two electrodes which are preferably in the form of ring electrodes and which are mounted on the working catheter at different locations from the reference units (4), wherein in relation to the electrodes the reference units (4) are in a previously established specific spatial position which can be taken into account by the processing units (16) when ascertaining the position of the working catheter (10) in the co-ordinate system defined by the reference catheter (2).

20. A system as set forth in one of the preceding claims comprising

control members (24, 26) at the proximal end of the working catheter (10), which are adapted to produce a rotation of the working catheter (10) and/or a flexing of the distal end (12) of the working catheter (10).

21. A system as set forth in one of the preceding claims comprising

a first signal line (34) which extends from the distal tip (30) to the proximal end of the working catheter (10) and which is connected to the working catheter reference units (4a-c),

a second signal line (35) which extends from the distal tip to the proximal end of the reference catheter (2) and which is connected to the reference catheter reference units (14a, b),

wherein the processing unit (16) is connected by way of the first signal line (34) to the working catheter reference units (4) and by way of the second signal line (35) to the reference catheter reference units (14), and

wherein the processing unit (16) is connected to the control members (24, 26) and is adapted to actuate the control members (24, 26) in response to the signals from the reference catheter reference units (14a, 14b) in order to produce a rotation or a flexing of the working catheter (10).

22. A working catheter having a distal tip (30) and a proximal end for use in a system as set forth in claim 1

characterised by

reference units (4a-c) which are adapted to send signals which are characteristic for the position of the working catheter (10), and

a signal line (34) which extends from the distal tip (30) to the proximal end of the working catheter and which is connected to the reference units (4a-c).

23. A reference catheter having a distal tip and a proximal end for use in a system as set forth in claim 1

characterised by

reference units (14a, b) which are adapted to receive position signals, and

a signal line (35) which extends from the distal tip to the proximal end of the reference catheter and which is connected to the reference units (14a, b).